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(54) TRANSPORTATION SYSTEM

(71) We, ALDEN SELF-TRANSIT SYSTEMS CORPORATION, a Corporation organised and existing under the Laws of the State of Massachusetts, United States of America, of 75 Wiggins Avenue, Bedford, State of Massachusetts, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to station arrangements for transportation systems.

In a transportation system, convenient arrangements must be provided for interchange of passengers to and from the vehicles on the transportation system both loading and unloading. Frequently such systems must efficiently handle large number of passengers and the system must be flexible and convenient so that the passengers may reach their desired destination as promptly as possible. In a particular arrangement, the transportation system is arranged to serve a series of stations and an endless loop form of artery system may be employed to serve such stations. In such an arrangement a bi-directional travel artery system permits a passenger entering the system to select the travel artery that will enable him to reach his destination by the shortest route.

The capsule type of transportation system that employs small vehicles routed as individual units through the transportation system under computer control provides a flexibility to meet the varying transportation demands on the system. In such a system, redundancy, load balancing capability, large passenger capacity, and bypass capability so that stops at intermediate stations are not required, are desirable.

According to the present invention there is provided a station arrangement for a transportation system having first and second parallel travel arteries the station arrangement comprising a station structure which is disposed at a position vertically displaced from said travel arteries, and which has four distinct service areas, a first station access path extending from the first travel artery to said station structure, and a second station access path extending from the second travel artery to said station structure, the first station access path dividing into first and second station service paths at a first junction, the second access path dividing into third and fourth station service paths at a second junction, each said station service path passing a corresponding station service area, the first station service path from the first access path merging with said fourth station service path from the second access path at a third junction to form a station exit path and the second station service path from said first access path merging with said third station service path from said second access path at a fourth junction to form a second station exit path, and each station exit path merging with a corresponding travel artery.

According to the present invention there is further provided a transportation system having a right of way in the form of a closed loop, first and second parallel travel arteries disposed in said right of way, a plurality of stations each arranged as described above spaced along said right of way for providing loading and unloading facilities for vehicles on said first and second travel arteries.

One embodiment of the present invention will now be described with reference to and as illustrated in the accompanying drawings in which:

Fig. 1 is a diagram of a transportation system;

[Price 25p]

Fig. 2 is a perspective view of a station arrangement employed in the transportation system shown in Fig. 1;

Fig. 3 is a plan view of the station arrangement shown in Fig. 2;

Fig. 4 is a side view of the station arrangement shown in Fig. 3;

Fig. 5 is an end view of the station arrangement shown in Fig. 3, but drawn to a larger scale.

The transportation system diagrammatically indicated in Fig. 1 includes a bi-directional loop right of way 10 that has two travel arteries 12, 14 that serve a series of spaced stations 16, 18, 20, 22, 24, 26, 28. Capsule-like vehicles 30 circulate along the right of way. A spur right of way 32 provides connection to terminal 34 which may serve another form of transportation system 36 or the spur 32 may connect with another loop system. Stations along a bi-directional right of way, spur or other arrangement may be similar to stations disposed along the loop. Vehicles leaving terminal 34 on artery 38 merge with loop artery 14 at junction 40 while vehicles leaving terminal 34 on artery 42 merge with loop artery 12 at junction 44. Similarly, vehicles on travel artery 12 may leave that artery at junction 46 for travel along spur artery 48 to terminal 34 and vehicles on travel artery 14 may leave that loop at junction 50 for travel to terminal 34 on spur artery 52.

Details of station arrangement 16, which is illustrative of the loop stations, are shown in Figs. 2-5. The station structure includes a platform area 60 that extends above the main travel arteries 12, 14 supported on piers 62. Station access path 64 branches from travel artery 14 at junction 66 and station access path 68 branches from travel artery 12 at junction 70. Station access path 64, at junction 72, branches into two station service paths 74, 76; and station access path 68, at junction 78, branches into two station service paths 80, 82 as shown in Fig. 3. The junctions 72 and 78 are located at diagonally opposite points of the station structure. Station service paths 76 and 80 merge at junction 84 to form a first station exit path 86 while service paths 74 and 82 merge at junction 88 to form a second station exit path 90. Station exit path 86 joins main artery 12 at junction 92 and station exit path 90 joins main artery 14 at junction 94. Additional station service paths parallel to paths 74, 76, 80 and 82 can be added if additional capacity is required.

The vehicles 30 that are employed in this transportation system, as indicated in Fig. 2, incorporate in-vehicle switching arrangements by which a desired path is selected by operation of vehicle switching apparatus carried by the vehicle. While other types of switching arrangements as well as various in-vehicle switching arrangements may be employed in a particular embodiment, a vehicle switching mechanism utilizes a biasable steering arrangement and two opposed sensor members, one of which is in engagement with a cooperating guide surface 102 or 104 that extends along the vehicle path. The biased steering arrangement steers the vehicle toward a selected one of the guide surfaces 102, 104 and the guide follower in contact with that surface overcomes the biasing force so that the guide surface controls the steering of the vehicle as it moves along the vehicle path. Selection of one of two paths at a junction, as at junction 66, is determined by the biasing of the steering mechanism to cause a particular guide follower to engage the appropriate guide surface. Further details of this steering system may be had with reference to copending United Kingdom Patent Application No. 17897/71, Serial No. 1342986. The vehicles 30 may be operated under computer control, and details of a suitable control system for such vehicles being disclosed in copending United Kingdom Patent Application No. 57256/70 (Serial No. 1340508). It will be apparent that other control systems may be utilized.

The platform station area 60 may be a large open area having suitable access and egress means such as escalators 106. Convenience or service facilities may be located appropriately as at area 108. Each station service path passes a corresponding station service area which has unloading, loading and/or storage areas. In the illustrated embodiment, service path 74 has unloading area 110 and loading area 112; service path 76 has unloading area 114 and loading area 116; service path 80 has unloading area 118 and loading area 120; and service path 82 has unloading area 122 and loading area 124. The platform area and service paths are enclosed by appropriate structures 126 and those structures together with piers 62 support roof 128.

In operation, if the vehicle is to bypass station 16, a vehicle on travel artery 14 remains on that artery and passes under platform area 60. If the vehicle has a destination at station 16 (either because it is carrying passengers for that station or there has been a request for a vehicle at that station, the switching mechanism biases the steering mechanism towards surface 104) the vehicle leaves the main travel artery at junction 66 and moves along the access path 64. If the vehicle is to continue along the main travel artery 14 after leaving station 16, the vehicle moves into service path 74 and stops at platform areas 110 and/or 112 to discharge and/or receive

passengers or cargo. The vehicle then is launched in synchronism with traffic on artery 14 and moves out of station 16, enters the exit path 90 and passes through junction 94 to rejoin the main travel artery 14 for passage in the direction of the next station 18. Should there be a greater demand for vehicles on the other travel artery 12 either due to passengers desiring to travel on artery 12 or for other reasons, the vehicle leaving the artery 14 at junction 66 enters service path 76 and moves through platform area 114. When the vehicle leaves it is appropriately launched in synchronism with the movement of vehicles on the main travel artery 12 for merging with service path 80 into exit path or ramp 86 and merging with artery 12 at junction 92. Thus the vehicle direction has been reversed and it moves along the main travel artery opposite to the artery from which it entered station 16, as illustrated by the direction-indicating arrows in Figure 3.

This arrangement provides a compact station layout and platform area that requires minimum space with loading to and unloading areas from two main travel arteries in either direction adjacent one another so that instructions for use may be displayed clearly and distinctly. Similarly there is great flexibility of the location of entrance and egress facilities to and from the platform area and loading (L) and unloading (UL) areas may be clearly demarcated as shown in Figure 2.

In the system arrangement shown in Fig. 1, this station arrangement provides great flexibility for the allocation of vehicles to the various stations around the loop 10 in accordance with changing demand. Further, should either travel artery be blocked so that vehicles cannot move along it, this station arrangement enables vehicles to move on both arteries to the station immediately before the obstruction and then to be switched onto the opposite artery, thus providing substantial service even though one of the arteries is blocked. In an application of this system to serve several airline terminals at an airport for example, the vehicles are moved between stations in accordance with the demand requests at high density; all vehicles that carry passengers not desiring to stop at intermediate stations directly bypass the stations; the stations are compact and require a minimum amount of area; and the system maximizes the flexibility, redundancy and reliability of operation of the system.

The present invention provides an economic station arrangement that provides economic use of material and space and provides convenient and flexible handling of passengers or material to be transported on the transportation system.

The station arrangement in accordance with the invention provides a bypass capability so that any station can be readily bypassed and there is no dependence or need for waiting at a station for other vehicles. Further, the station arrangement provides load balancing flexibility and redundancy so that if one artery section is shut down vehicles can be shunted to another artery section to maintain service at a high degree of capacity. It will be obvious that plural loading areas may be associated with one or more service paths, each loading area for example being associated with a corresponding exit path and the exit paths being connected to travel arteries other than travel arteries12 and 14.

WHAT WE CLAIM IS:—

1. A station arrangement for a transportation system having first and second parallel travel arteries, the station arrangement comprising a station structure which is disposed at a position vertically displaced from said travel arteries, and which has four distinct service areas, a first station access path extending from the first travel artery to said station structure, and a second station access path extending from the second travel artery to said station structure, the first station access path dividing into first and second station service paths at a first junction, the second access path dividing into third and fourth station service patns at a second junction, each said station service path passing a corresponding station service area, the first station service path from the first access path merging with said fourth station service path from the second access path at a third junction to form a station exit path and the second station service path from said first access path merging with said third station service path from said second access path at a fourth junction to form a second station exit path, and each station exit path merging with a corresponding travel artery.

2. A station arrangement as claimed in claim 1 wherein said first and second junctions are located at diagonally opposite points of said station structure.

3. A station arrangement as claimed in claim 1 wherein each of said station service areas defines an unloading, and a loading area and/or a storage area along which each said station service path passes.

4. A station arrangement substantially as hereinbefore described with reference to and as illustrated in Figures 2 to 5 of the accompanying drawings.

5. A transportation system having a

right of way in the form of a closed loop, first and second parallel travel arteries disposed in said right of way, a plurality of stations each arranged as claimed in any of the previous claims spaced along said right of way for providing loading and unloading facilities for vehicles on said first and second travel arteries.

6. A transportation system as claimed in claim 5 wherein each vehicle employed on said transportation system includes an in-vehicle switching mechanism and further including guide surfaces cooperating with said in-vehicle switching mechanism extending along said travel arteries and said paths.

7. A transportation system substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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2 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheet 1

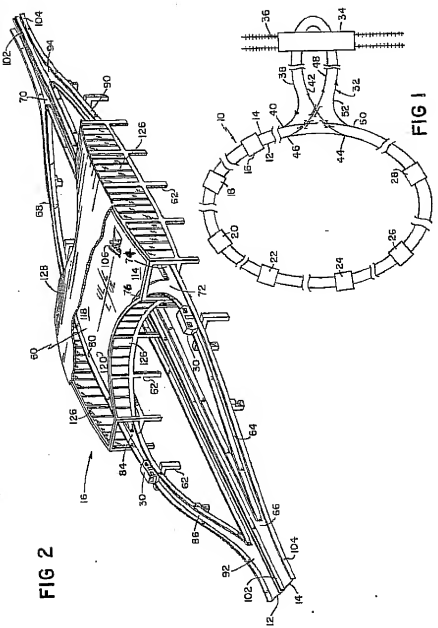

FIG 1

FIG 2

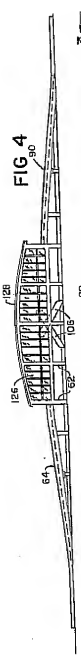
FIG 4
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FIG 3
FIG 5